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SUMMARY - TWO MOSI MEAN 1.4 Full 1.50

DATE: 8-31 T. m 9-2

PRJ. JCT: Wings SUPPLY BY: TYSON
Whole Birds & Drums

PTO-003960

UNIT: FIRM STAINLESS STEEL INC.			PR. JCT: Whole Birds & Ducks			TYSON			8-31			7-2		
COOKING TRIAL DATA SHEET												REMARKS		
TEST No.	BELT SPEED	COOK TIME	TEMPERATURES °C			START WEIGHT	COOKED WEIGHT	YIELD	INTERNAL TEMP. °F					
			ZONE 1	ZONE 2	ZONE 3									
#8	HZ: 13.3 (SLOW)	65.5 MIN	180°C Sup Ht	190°C Sup Ht	195°C	30.52	25.16	82.5%	195°F	10 BIRDS *				
#9	HZ: 15.5 (SLOW)	57 MIN	180°C Sup Ht	190°C Sup Ht	200°C	9.600	7.54	83.8%	180°F 184°F	WITH SPRAY in 3rd MODULE				
			IN THIS TEST (F) WE SPRAYED R. A. WOULD IN 3rd MODULE - (LAST 19 MINUTES)											
										* WE ATE 2 BIRDS - RETURNING				
#12	HZ: 14.4 (FAST)	16 MIN	180°C Sup Ht	190°C Sup Ht	200°C	12.435	9.78	79%	190°F	RETURNING and RETURNING				

8 whole BIRDS

3 Whole Birds

Hot wings (Quaints)

U-02911

M E M O R A N D U M

TO: Scott Christensen
FROM: Jeff Dierenfeld
DATE: July 25, 1995
RE: Bowl Breast Dip Test

Over the past several weeks, we have been testing many different methods of smoking our bowl breasts to reduce the cycle time of the second cook and in the process, improve the yield. We have just finished the final test which consisted of a 90 second bath in a 100% solution of mesquite smoke, and a dry 180 deg cook for 50 min. We tested a four rack batch. The color is very good, and the yields are greatly improved. We only need sales to approve the opposite effect that the netting leaves when it has been dipped (I am looking for alternative nettings). I will also contact Red Arrow to see if we can tone down the smoke flavor, which may be a bit too strong at this point.

Please review the information below for details:

TEST DATA			CURRENT METHOD		
		YIELD			YIELD
DIPPED WT	7,899.00		STRIP WT.	7,899.00	
2nd COOK	7,713.00	97.65%	2nd COOK	7,091.72	89.78%
DIFFERENCE====>			7.87%		

If we apply this 7.87% towards the estimated 14,000,000 lbs projected for 1996, we gain an additional 1,101,800 lbs in finished goods tonnage.

c Dave Gruis

CONFIDENTIAL-RESTRICTED ACCESS

U-7948

PTO-003961

UNITHERM FOOD SYSTEMS

1108 WEST HARTFORD
PONCA CITY, OK 74601

Telephone (405) 762-0197
Fax (405) 762-0199

22 September 1995

Lee Kramer
Bryan Foods
PO Box 1177
100 Churchill Road
West Point
Memphis City
MS 39773
USA

Dear Mr. Kramer,

Re: Continuous RF Cooking of Emulsified Ham

With regard to your recent conversation with Mr. David Howard of Unitherm Food Systems, Oklahoma, please consider the following description and quotation of the in-line Radio Frequency (RF) heating of emulsified ham.

1. Introduction

In its simplest form Radio Frequency (RF) heating is achieved by placing the dielectric material to be heated (food) between two parallel plates resonating at a frequency of 13.56 MHz. In theory, the dielectric field strength between the two plates is constant resulting in a uniform temperature rise of the product. The rate of heating and the efficiency of the process is dependent upon the dielectric properties of the food being heated. In the case of emulsified meats this is an averaged value of the individual dielectric properties of the separate ingredients.

Past experience in RF cooking of food with a high salt content such as ham have been unsuccessful when a parallel plate electrode arrangement has been utilised. This is due to the salts dissolving within the residual meat juices to form an electrically conductive solution. Once this arises, a conductive path between the metallic electrodes is developed leading to arcing, food discolouration and damage to the processing equipment. It is due to this reason that microwave heating is usually preferred to RF for dielectric cooking of high salt content foods. However, with an understanding of the dielectric properties of the food and a knowledge of RF equipment design it is possible to successfully heat high salt content based products such as emulsified ham.

2. Continual RF Cooking of Emulsified Ham

Several companies world-wide have tried to continually cook food as it is pumped through a polymeric pipe positioned between two RF plates. In theory the technique is simple, however, virtually all have failed to reach the market due to scorching and non-uniformity of heating. This is caused by a lack of understanding of the dielectric properties of the food and how to engineer the equipment to compensate. The

PTO-003962

U-03498

problem is caused by the large step change in the dielectric constant between the meat and surrounding air gap. This results in focusing of the electric field intensity towards the edges of the meat resulting in scorching. This can be compensated for by "Electric Field Profiling" by surrounding the product tube with a dielectric material other than air. De-ionised water is an ideal fluid due to its very low loss factor at 13.56 MHz hence no RF power is wasted in heating the water, but it has a similar dielectric constant to the emulsified meat hence focusing of the electric field is avoided resulting in an almost uniform temperature distribution throughout the product.

The use of recirculating temperature controlled de-ionised water as the field profiling dielectric also facilitates improved control of the meat skin temperature within the pipe. This is advantageous as a cooler skin temperature improves flow and subsequent handling/ slicing.

The simplest profile to cook using this technique is circular, however through the use of additional strips of dielectric material placed around the periphery of the polymeric channel, it is in theory possible to process almost any profile. A rectangular section would, without additional electric field profiling result in over cooking of the corners due to focusing.

3. Delivery System

The method of product delivery to the RF unit is of paramount importance as it is essential that voids within the meat emulsion are avoided. Their presence again results in field profiling around this localised air gap resulting in scorching. It is for this reason why a vertical or inclined pipe is chosen over a horizontal one, thus preventing the fluid from running freely as it is heated and its viscosity changes prior to coagulation.

4. Cooling & Slicing

Using conventional contacting mechanical slicers it is difficult to process hot meat prior to chilling and packaging. An alternative method is to utilise a non-contacting cutting technique such as water jetting, although past experience has demonstrated that waste levels are increased caused by the finite kerf width. This is compounded by the problem of cleaning the collected effluent prior to discharge. For this reason Unitherm recommend the use of a rapid brine chiller and automated equilibration buffer where the processed logs can be stored prior to slicing at any desired temperature.

5. Facts & Figures for the RF in-line cooker

Max. cooking rate	~0.5°C/s
Target through-put	2000 kg/hr
RF power requirement	164 kW
RF capacity	180 kW (3 generators)
Product cross section	6" x 4" (152mm x 100mm)
Working tube length	20' (~6m)
Machine footprint (approx.)	26' (8m) long x 8' (2.5m) wide

6. Quotation for Complete System

The following is a quotation for a complete line based around a RF continuous cooker producing a nominal output of 2000kg/hr. This price includes feed hopper, pump, RF cooker and brine chiller.

Item	Cost
Hopper	
Pump	
RF cooker	
Bagging unit	
Guillotine and clip unit	
Brine chiller	
	\$1.8M

Delivery Lead Time: 26 weeks

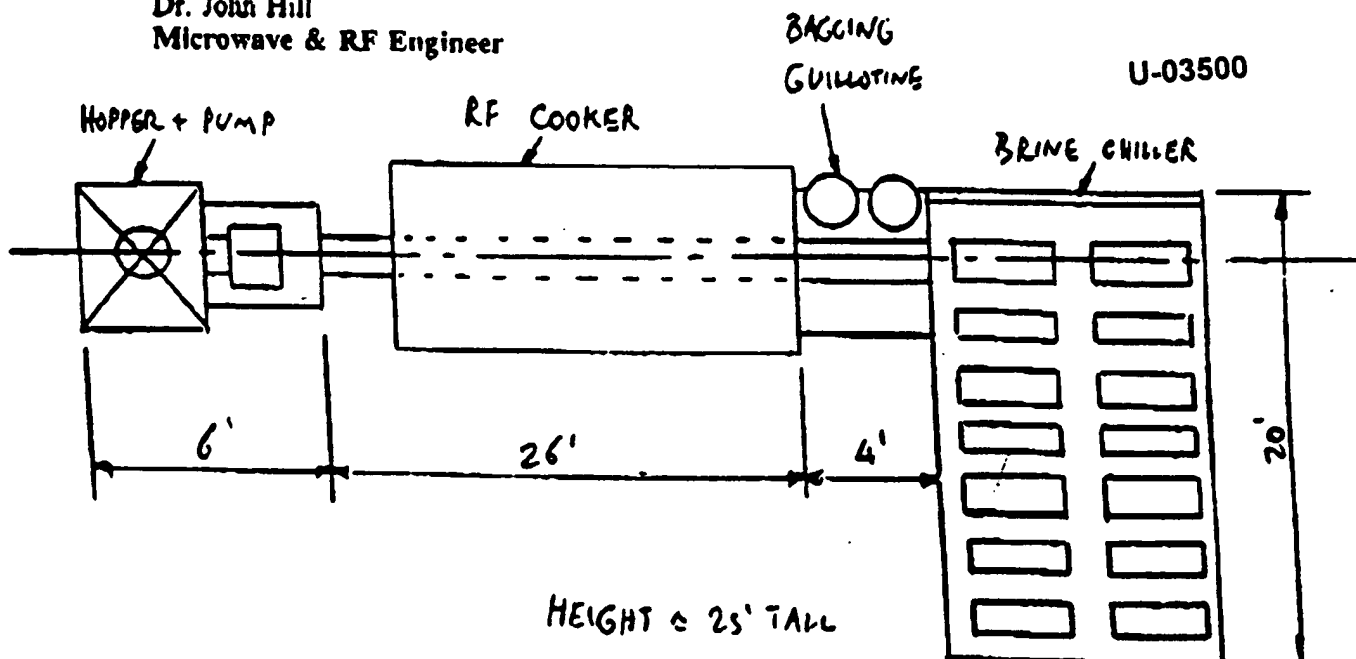
Payment Terms: 30% Downpayment with confirmed order
20% On the 14th week
40% On shipping
10% Payable in 30 days after installation

I trust that this information meets with your expectations and I look forward to being of assistance in the future.

Yours sincerely,
for UNITHERM FOOD SYSTEMS

Dr. John Hill

Dr. John Hill
Microwave & RF Engineer



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UNITHERM FOOD SYSTEMS INCORPORATED
1108 WEST HARTFORD
PONCA CITY, OKLAHOMA 74601
TELEPHONE: 405-762-0197
X: 405-762-0199

FAXED
10-16-95



A WORLD OF STAINLESS STEEL PRODUCTS

October 16, 1995

Prem Singh
Armour Swift Eckrich
2001 Butterfield Road
Downers Grove, IL 60515

We are shipping the Rapid Flow on Friday, the 20th of October. It will be delivered to you on Monday, the 23rd. Two of Unitherm's engineers will be on site to help install the oven. The arrangement we discussed for the trial was that Armour Swift Eckrich would pay for the transport and commissioning engineers. I would appreciate your assistance in making sure we have a purchase order to invoice this against.

The specific criteria for the trial was:

- 1) Liquid smoke application for turkey breasts.
Dwell time 7.5 minutes at 330o C.
Internal temperature will rise by 1o C.
1% Shrinkage.
- 2) Browning turkey breasts with skin on.
Dwell time 15 minutes at 330o C.
5% shrinkage.
(No glaze.)
- 3) Glazing both hams and turkeys.
Dwell time 3 minutes at 330o C.
- 4) Cooking of full turkeys i.e. nominal 12-14 lbs.
Cook time 1 hour 50 minutes at 250o C.
- 5) Any other products you wish to try.
Philly cheese steak beef.
Sausage links.
Patties, etc.

U-03520

Prem Singh

October 16, 1995

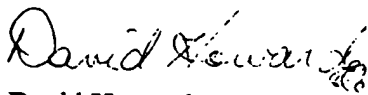
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Jim Gaydusek and I will help you understand the oven and offer guidance for various products.

Site Requirements:

Electric	232 KW
Steam	50 kg/hr @ 6-8 bar
Exhaust	1800 cfm/Fan
Foot print	2-zone Rapid Flow

Regards,



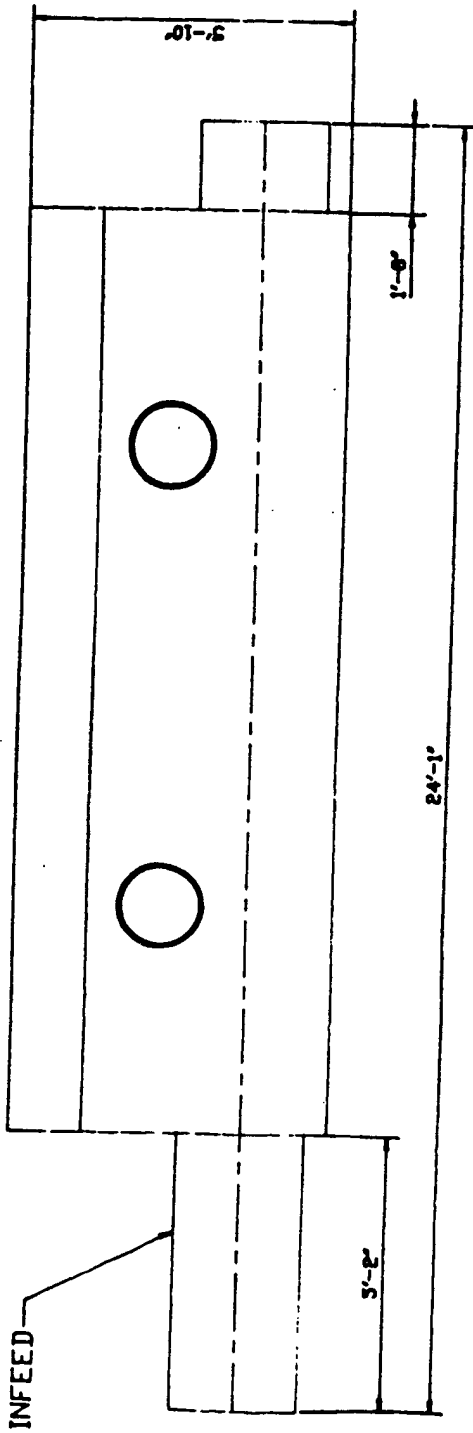
David Howard
President

151DM

U-03521

PTO-003966

PLAN VIEW



U-03522

PTO-003967